Lochsa River Summer Steelhead
Population Viability Assessment

The Lochsa River steelhead population (Figure 1) is part of the Snake River Steelhead DPS which has six major population groupings, including: Lower Snake River, Clearwater River, Grande Ronde River, Salmon River, Hells Canyon, and the Imnaha River. The DPS contains both A and B run steelhead. The Lochsa River population is a B-run population and resides in the Clearwater River MPG.

The ICTRT classified the Lochsa River population as a "large" population (Table 1) based on historical habitat potential (ICTRT 2005). A steelhead population classified as large has a mean minimum abundance threshold of 1500 naturally produced spawners with sufficient intrinsic productivity to achieve a 5% or less risk of extinction over a 100-year timeframe.

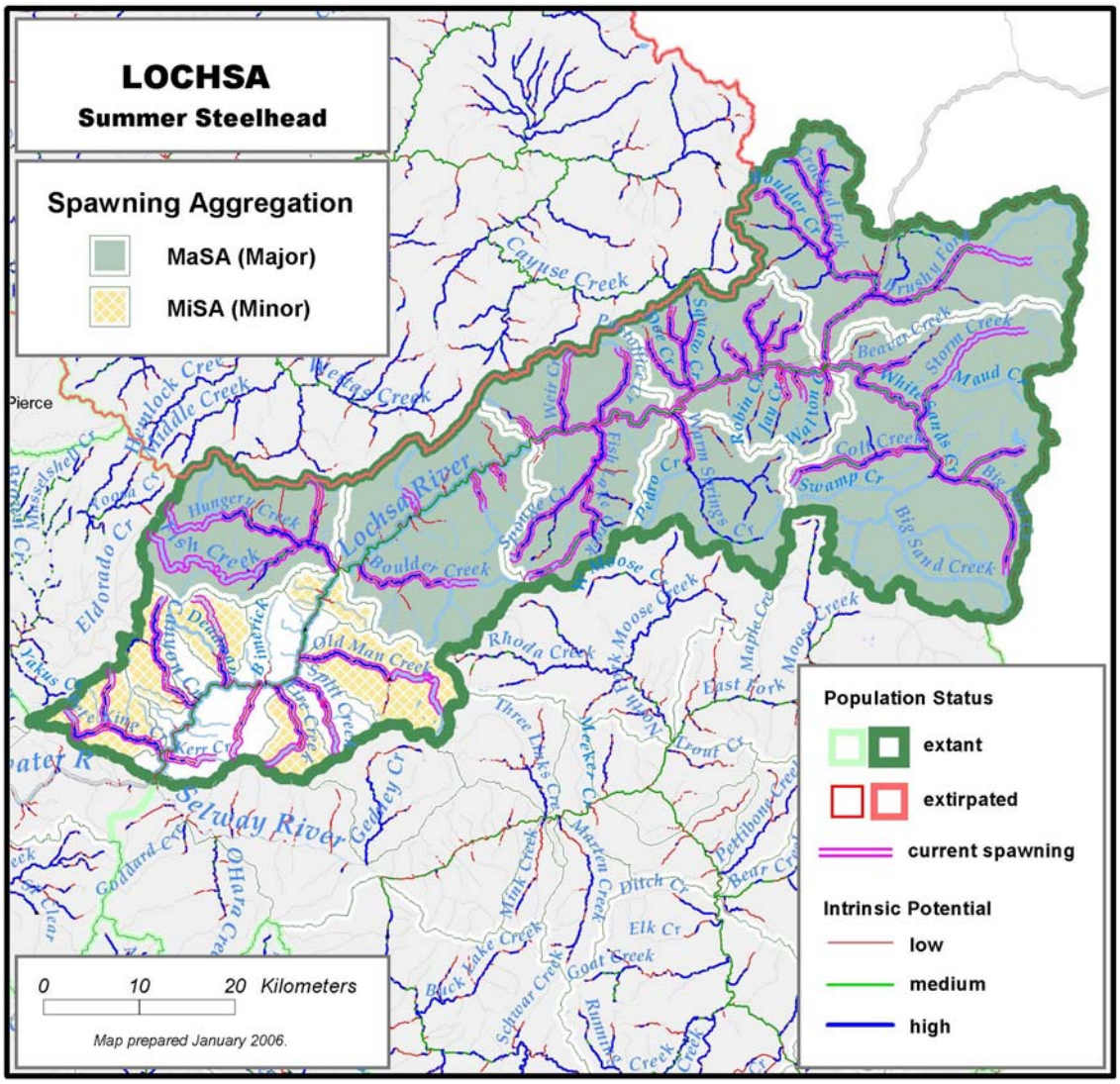

Figure 1. Lochsa River steelhead major and minor spawning areas.

Table 1. Lochsa River steelhead basin statistics

Drainage Area (km2)	3,060
Stream lengths km* (total)	1,252
Stream lengths km* (below natural barriers)	787
Branched stream area weighted by intrinsic potential (km2)	3.662
Branched stream area km2 (weighted and temp. limited)	3.662
Total stream area weighted by intrinsic potential (km2)	5.062
Total stream area weighted by intrinsic potential (km2) temp limited	5.062
Size / Complexity category	Large / "B" (dendritic structure)
Number of MaSAs	7
Number of MiSAs	6

*All stream segments greater than or equal to 3.8m bankfull width were included
**Temperature limited areas were assessed by subtracting area where the mean weekly modeled water temperature was greater than 22ºC.

Current Abundance and Productivity

Current natural abundance (number of adult spawning in natural production areas) is unknown for this population. While the aggregate B-run abundance for the DPS can be quantified based on counts at Lower Granite Dam, it is extremely difficult to census abundance at the population level. The ICTRT developed a generic dataset for B-run steelhead populations to be used for a preliminary assessment of abundance productivity risk. The dataset was derived by distributing the natural-origin steelhead counted annually at Lower Granite Dam equally across the nine extant B-run populations. The average size category across the nine populations is Intermediate, therefore the generic abundance/productivity risk was measured against a minimum threshold abundance of 1,000 spawners.

The occurrence of adult hatchery fish in the population is unknown. Hatchery-origin steelhead could have returned to various tributaries within the population from fry releases made from 1973 through 1982. Hatchery steelhead fry were released in eight of the ten years during that period; a total of 5.93 million fry were released during the ten-year period.

Abundance for the generic "B" run steelhead in recent years has been moderately variable, the most recent 10-year geometric mean number of natural spawners was 272 (Table 2). During the period 1986-1998, returns per spawner for the generic "B" run steelhead dataset ranged from 0.24 (1990) to 6.63 (1998). The most recent 13-year SAR adjusted and delimited (at 750 spawners) geometric mean of returns per spawner was 0.85 (Table 2).

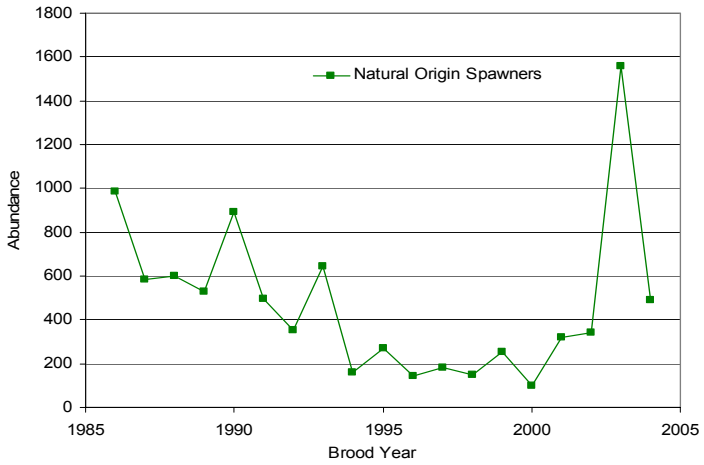

Figure 2. Generic "B" run steelhead abundance (1986-2004). Estimates based on dam counts.

Table 2. Generic "B" run steelhead abundance and productivity measures. These data are used as a surrogate for "B" run steelhead where no population-specific dataset exists. FOR GENERAL EVALUATION ONLY.

10-year geomean natural abundance	272
13-year return/spawner productivity	0.82
13-year return/spawner productivity, SAR adj. and delimited*	0.85
13-year Bev-Holt fit productivity, SAR adjusted	1.30
13-year Lambda productivity estimate	1.00
Average proportion natural origin spawners (recent 10 years)	1.0
Reproductive success adj. for hatchery origin spawners	n/a

*Delimited productivity excludes any spawner/return pair where the spawner number exceeds 750. This approach attempts to remove density dependence effects that may influence the productivity estimate.

Comparison to the Viability Curve

- Abundance: 10-year geometric mean natural spawners
- Productivity: 13-year return/spawner adjusted for marine survival and delimited at 750 spawners
- Curve: Hockey-Stick curve
- Conclusion: Generic "B" run steelhead populations are at **HIGH RISK** with respect to abundance and productivity.

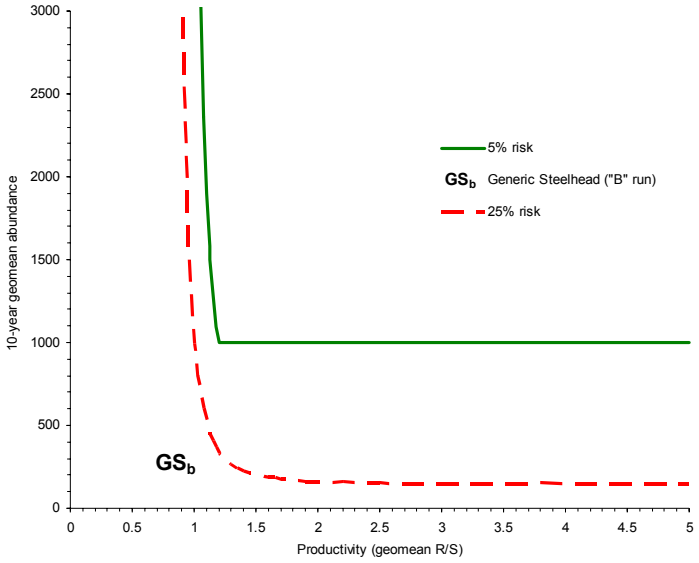

Figure 3. Generic "B" run steelhead abundance and productivity metrics against the viability curve for this ESU. This is not a population specific estimate—INTENTED FOR GENERAL EVALUATION ONLY.

Spatial Structure and Diversity

The ICTRT has identified seven major spawning areas (MaSAs) and six minor spawning areas (MiSAs) within the Lochsa River steelhead population. A limited number of spawner surveys have been conducted across the population. Spawning is distributed widely across the population, and occurs in all major and minor spawning areas. All major tributaries and numerous small tributaries are currently utilized (Fig. 1).

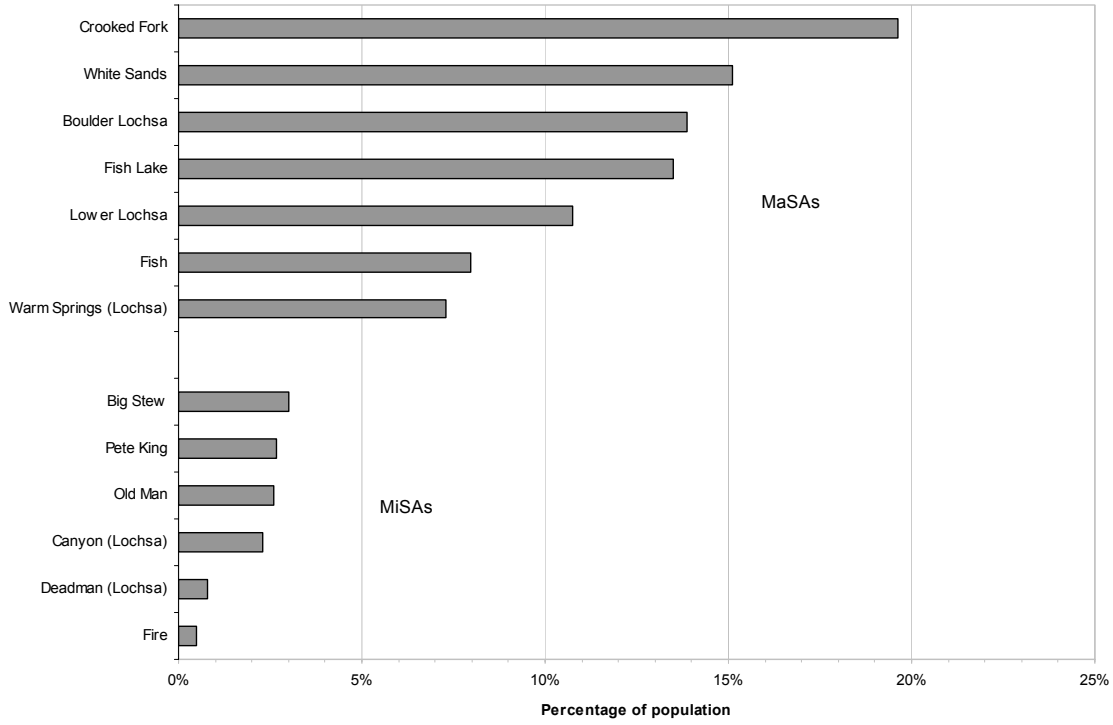

Figure 4. Proportion of major and minor spawning areas that make up the Lochsa River steelhead population. There are no modeled temperature limitations for the MiSAs/MaSAs

Factors and Metrics

A.1.a. Number and spatial arrangement of spawning areas.
The Lochsa River steelhead population contains seven major and six minor spawning areas. The metric is rated *Very Low* risk.

A.l.b. Spatial extent or range of population.

Habitat use by steelhead was determined from steelhead redd counts and juvenile surveys conducted by IDFG. Redd count data for the population is very limited, especially with respect to the number and frequency of surveys. The data shows widely distributed utilization. Although The Warm Springs MaSA is documented as being occupied in only the lower half and does not meet the criteria for an occupied MaSA, this metric was rated as *Very Low Risk*. The redd distribution data is not current and may not reflect the true current status of spawning utilization. Because of the extensive amount of branching in the population, it is not likely that risk is substantially increased by the loss non-occupancy in one-half of one MaSA.

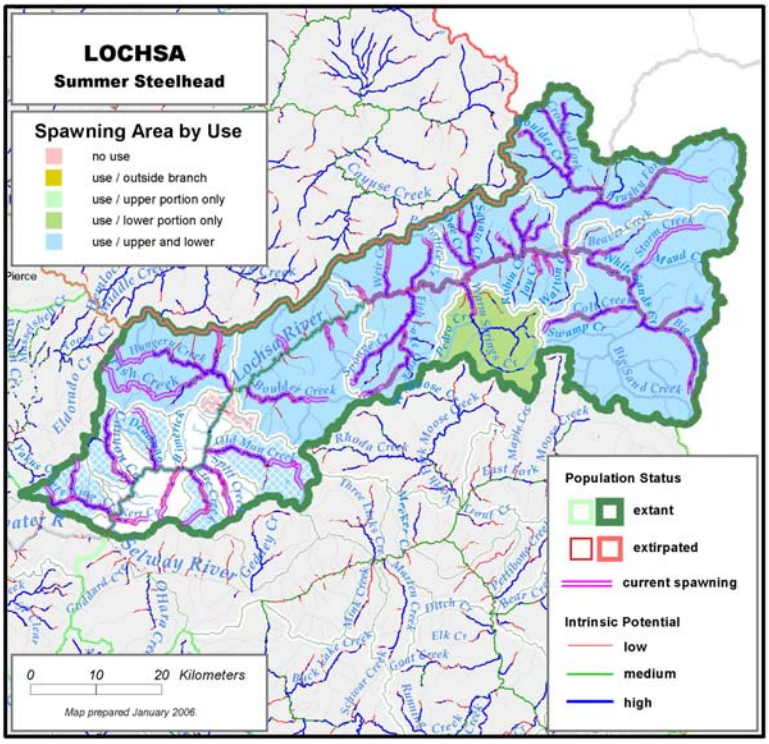

Figure 5. Lochsa River steelhead distribution.

A.1.c. Increase or decrease in gaps or continuities between spawning areas.
There has been no or very little change in gaps between spawning aggregates when comparing current and historic distributions. The population is rated at *Very Low* risk because all historical MaSAs are occupied (Warm Springs is occupied in the lower half so no gap is created), gap distance and continuity have changed none or little, and there has been no increase in distance between this population and other populations in the MPG or DPS. Lack of occupancy in one MiSA does not produce a large enough increase in gap distance to increase the risk.

B.1.a. Major life history strategies.
There are limited data to allow any direct comparisons between historic life history strategies and current strategies. Anthropogenic impacts have resulted in habitat changes from historic conditions however, it is not likely those habitat changes have influenced major life history strategies or pathways. Anadromous *O. mykiss* persists in the population, only the adult summer run timing was present historically and it is presumed that only B-run type fish historically occupied the population. It appears all historic major life history pathways are present, although

the mean and variability may have shifted slightly. The population was rated at *Low Risk* for this metric.

B.1.b. Phenotypic variation.
There is no direct evidence for loss or substantial change in phenotypic traits from historic conditions. Changes in flow patterns and temperature profiles in reaches downstream of the population boundary likely have reduced the variation in both juvenile migration and adult spawn timing. Reduced flows and elevated water temperatures result in a narrower window for successful smolt outmigration as well as truncation of adult spawn timing. Adult entry into freshwater and arrival on the spawning grounds likely has not changed however, adult entry into the Snake River and migration through the lower Snake River in late summer and early fall is delayed because of elevated mainstem temperatures. It is hypothesized that adult upstream migration has changed from historic conditions due to temperature effects; magnitude of the change is unknown. The population is rated at *Low Risk* for this metric because of the substantial change in adult run timing and likely changes in the mean and variability of juvenile migration and movement patterns.

B.1.c. Genetic variation.
Genetic ratings for populations were based on IC-TRT analysis of allozyme data presented in Winans et al. (2001) and Waples et al. (1993) and microsatellite data presented in Moran (2003). Some fine-scale spatial structure was evident within the Lochsa River population. Geographically consistent clustering patterns were observed in microsatellite data, both within and between populations. This metric was rated *Very Low Risk.*

B.2.a. Spawner composition.
No surveys are conducted to determine the proportion of naturally spawning fish that are hatchery origin. There is a brief history of outplaning hatchery steelhead fry into several tributaries within the population; presumably the fish were Dworshak Hatchery B-run stock. Total numbers of steelhead fry released annually ranged from 150,000 and 1.5 million. Fry were released every year from 1973 through 1982 except 1975 and 1976. Adult steelhead were released into the population in four different years. Adults were released only into the Lochsa River in 1973, 1979 and 1990. The database entry for the 1990 release (51 fish) most likely refers to natural origin steelhead that were trapped in Walton Creek as part of a data gathering exercise and should not be considered hatchery fish. In 1981 adult were released into Post Office Creek (162 fish) and Squaw Creek (86 fish). There is no documentation of any releases after 1990. All releases are presumed to be Dworshak hatchery B-run stock.

(1) *Out-of-DPS strays*. This sub-metric was not rated because there is no data. The number of out-of-DPS strays in the population likely is zero or negligible, based on observations in the downstream Clearwater Lower Mainstem steelhead population.

(2) *Out-of-MPG strays from within the ESU*. This sub-metric was not rated because there is no data.

(3) *Out of population within MPG strays*. Neither the occurrence nor the number of out-of-population-within-MPG strays is known. Out-of-MPG hatchery steelhead are deliberately

released into populations downstream of the Lochsa River population under current management programs for harvest augmentation and to supplement the natural population. This sub-metric is rated as Low Risk because of the duration (multiple generations) of releases and the potential for the natural spawning population to consist of some hatchery-origin fish.

(4) *Within-population hatchery spawners.* This sub-metric was not rated; there is no within-population hatchery program.

B.3.a. Distribution of population across habitat types.

The Lochsa River steelhead population intrinsic potential habitat historically was distributed across six EPA level IV ecoregions (Table 3 and Fig. 6). Only two of the ecoregions contained more than 10% of the total population historical branched spawning area and were considered in the rating of this metric. The metric was rated *Low Risk* as there were no substantial changes in ecoregion occupancy. This is the lowest risk rating the population could achieve for this metric.

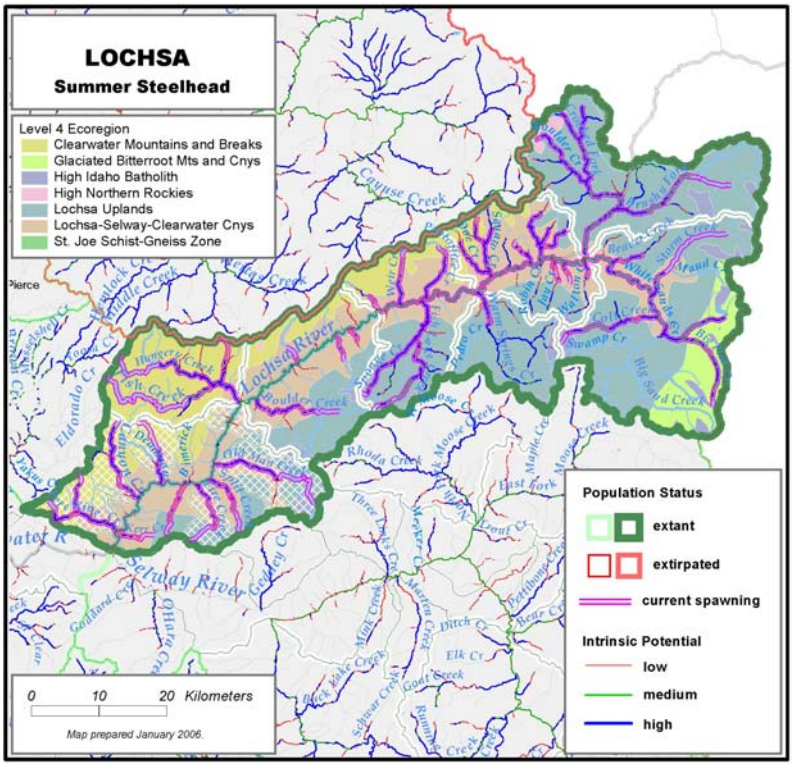

Figure 6. Lochsa River steelhead population distribution across various ecoregions.

Table 3. Lochsa River steelhead—proportion of spawning areas across various ecoregions.

Ecoregion	% of historical branch spawning area in this ecoregion (non-temperature limited)	% of currently occupied spawning temperature limited)
Clearwater Mountains and Breaks	9.2	9.9
Glaciated Bitterroot Mountains and Canyons	1.9	2.2
High Idaho Batholith	0.1	0.1
High Northern Rockies	0.2	0.2
Lochsa Uplands	35.6	28.4
Lochsa-Selway Clearwater Canyons	52.9	59.2

B.4.a. Selective change in natural processes or selective impacts.

Hydropower system: The hydrosystem and associated reservoirs impose some selective mortality on smolt outmigrants and adult migrants, the selective mortality is not likely to remove more than 25% of the affected individuals. The likely impacts are rated as *Low Risk* for this action.

Harvest: Overall harvest impacts on steelhead populations are unknown. There are no freshwater recreational fisheries directly targeting naturally produced steelhead; indirect mortalities are expected to occur in some fisheries selective for hatchery fish. It is unlikely that the incidental mortalities from recreational fisheries are selective. Harvest of steelhead in mainstem Columbia River gillnet fisheries may be selective, related to the mesh size of gillnets used. Further assessment is necessary to determine the extent of selective mortality occurring related to harvest. This action was rated as *Moderate Risk* because the population has been affected over many generations, the action is expected to continue into the future and because of the high degree of uncertainty in overall effect.

Hatcheries: There are no hatchery programs within this population and hatchery programs in proximate populations are not suspected to have a selective impact on this population. The selective impact of hatchery actions was rated as *Low* risk.

Habitat: Habitat changes resulting from land use activities in the basin may impose some selective mortality, but the extent is unknown. It is likely that any selective mortality impacts would affect a non-negligible portion of the population. This selective impact was rated *Low Risk*.

Spatial Structure and Diversity Summary

Overall spatial structure and diversity has been rated *Low Risk* for the Lochsa River steelhead population (Table 4). This risk rating is driven by uncertainty in several metrics, which resulted in Low risk ratings for phenotypic and genotypic expression and spawner composition.

Table 4. Spatial structure and diversity risk scoring table. "NR" scores indicate the metric was not rated.

Metric	Risk Assessment Scores				
	Metric	Factor	Mechanism	Goal	Population
A.1.a	VL (2)	VL (2)	Very Low Risk (Mean=2)	Very Low Risk	**Low Risk**
A.1.b	VL (2)	VL (2)			
A.1.c	VL (2)	VL (2)			
B.1.a	L (1)	L (1)	Low Risk (1)	Low Risk	
B.1.b	L (1)	L (1)			
B.1.c	VL (2)	VL (2)			
B.2.a(1)	NR	L (1)	Low Risk (1)		
B.2.a(2)	NR				
B.2.a(3)	L (1)				
B.2.a(4)	NR				
B.3.a	L (1)	L (1)	Low Risk (1)		
B.4.a	M (0)	M (0)	Moderate Risk (0)		

Overall Viability Rating

The Lochsa River steelhead population does not currently meet viability criteria because Abundance/Productivity risk tentatively has been rated as High Risk and does not meet the criteria for a viable population (Fig. 7). Improvement in abundance/productivity status (reduction of risk level) will need to occur before the population can be considered viable. Also, the population currently does meet the criteria for a "maintained" population but the overall spatial structure/diversity rating is sufficiently low that the population could achieve Highly Viable status.

		Spatial Structure/Diversity Risk			
		Very Low	**Low**	**Moderate**	**High**
Abundance/ Productivity Risk	**Very Low** (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M	
	High (>25%)		Lochsa River		

Viability Key: HV – Highly Viable; V – Viable; M – Maintained; Shaded cells – does not meet viability criteria.

Figure 7. Viable Salmonid Population parameter risk ratings for the Lochsa River steelhead population. This population does not meeting viability critera.